

providing a coal sample;

directing only X-rays toward the coal sample;

detecting X-ray fluorescence from the coal sample using an X-ray detector

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^{Cont} c producing signals in response thereto, mounted within two inches of the sample; and

presenting an elemental composition of the coal sample based on the signals

produced.

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¹⁴ 24. (New Claim) The method according to Claim ¹³23, further including leveling the coal sample to ensure that the detecting step is repeatable.

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¹⁵ 25. (New Claim) The method according to Claim ¹³23, wherein providing the coal sample includes placing the coal sample on a moving conveyor belt.

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¹⁶ 26. (New Claim) The method according to Claim ¹³23, wherein the directing of only X-rays is completed by at least one X-ray source.

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¹⁷ 27. (New Claim) The method according to Claim ¹⁶26, wherein said at least one X-ray source is characterized by a transmission axis, said at least one X-ray fluorescence detector is characterized by a detection axis, and wherein X-ray transmission axis and said detection axis are parallel to each other and normal to the coal sample.

REMARKS

The Office Action dated November 15, 1999 has been carefully reviewed and considered. The indication of allowable subject matter in Claims 2 and 4 is noted with appreciation.

First addressing the formal matters raised, several amendments are submitted to the

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specification, including: (1) an amendment to correct the typographical error on page 5, as requested; and (2) an amendment to the Abstract to correct the transcription error noted. The specification is also amended to correct other deficiencies and minor errors, including identifying the missing reference numerals, without adding new matter. Also, in view of the indication of allowable subject matter, formal drawings are now submitted for consideration by the Official Draftsperson and Examiner.

With regard to the substantive issues, Applicant amends Claim 1 to include the limitations of substantively allowed Claim 4; namely, that the at least one X-ray fluorescence detector is mounted within two inches of the sample to maximize X-ray detection and sensitivity. Furthermore, several of the original dependent claims are canceled, including Claims 2, 7, 10, 14 and 15, while several others are amended to correct formal matters and to clarify the inventions claimed. Additionally, new dependent Claims 16 and 17 are presented for consideration, which cover: (1) the specific range of incident X-rays produced by the X-ray source; and (2) the analyzer for determining the elemental composition of the sample based on the signals received from the X-ray fluorescence detector. Based on the substantive allowability of Claim 1, it is believed that dependent Claims 3-6, 8-9, 11-13, and 16-17 are likewise in condition for allowance.

New Claims 18-27 are also submitted for consideration. Claim 18 is simply Claim 1 amended to include the limitations of substantively allowed Claim 4; namely that the X-ray transmission axis and the X-ray fluorescence detection axis are parallel to each other and normal to the sample surface. Consequently, it is considered allowable as written.

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New independent Claim 19 covers the apparatus of the present invention wherein a single X-ray detector is provided between at least two X-ray sources. This arrangement is illustrated in the specification as the most preferred embodiment, and it is submitted that none of the prior art patents cited, including the Page et al. '894 patent, the Page '124 patent, or the Elder '883 patent, disclose, teach or even remotely suggest this configuration. In fact, the Elder '883 patent actually teaches the opposite of such an arrangement, since it expressly discloses positioning a *single source* between a *pair of detectors* (see Figure 3). The Page et al. '894 patent merely shows a single X-ray source and detector, and thus cannot anticipate this invention or render it obvious. The earlier Page '124 patent shows two X-ray sources and two proportional counters, or detectors, but the "*between*" limitation is not met. Moreover, since none of these patents disclose this express limitation of Claim 19, their combination cannot render this invention obvious. Therefore, it is believed that this claim, as well as dependent Claims 20-22, are likewise in condition for allowance.

Finally, new method Claims 23-27 are presented for consideration and are believed to provide the Applicant with the additional scope of coverage to which he is clearly entitled in view of the prior art uncovered by the Examiner. Like Claim 1, Claim 23 references mounting an X-ray detector within two inches of the sample and should, therefore, be allowed over the prior art for the same reasons original Claim 2 was substantively allowed. Of course, establishment of the patentability of Claim 23 also serves to establish the patentability of new Claims 24-27 which depend therefrom.

In summary, all issues raised in the Office Action of November 15, 1999 have been

addressed in accordance with Rule 111(a), 37 C.F.R. Section 1.111(a). Specifically, the specification is amended to make the corrections noted by the Examiner, and formal drawings are now submitted for consideration. The allowed subject matter of Claim 2 is accepted through an amendment to Claim 1. Likewise, new Claim 18 is submitted to include the limitations of substantively allowed Claim 4. Finally, new sets of apparatus and method claims are presented to provide coverage of a scope that the Applicant is clearly entitled to in view of the teachings of the prior art uncovered by the Examiner. Since it is believed that all outstanding issues have been addressed and all claims are patentable, an early Notice of Allowance is earnestly solicited. However, if the Examiner finds that some minor issue has been overlooked or some other matter requires further attention, please contact the Applicant's Counsel at the number listed below.

Respectfully Submitted,

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2/9/00

